

Sheetflow: Where Does All That Water Go?

Subjects: Science, Water Cycle, Environmental Engineering

Location: Indoors, classroom

Duration: 45 – 60 minutes

Sunshine State Curriculum Standards:

SC.4.E.6.3; SC.4.L.17; SC.4.N.1; SC.4.P.8; SC.5.E.7; SC.5.N.1;
SC.6.E.7; SC.6.N.1; SS.4.G.1; SS.5.G.3; SS.5.G.4; SS.6.G.1.6;
SS.6.G.2.1; SS.6.G.5



Objectives: After this lesson, students will be able to define the terms aquifer and percolation, and explain how these terms fit into our water cycle. They will also be able to explain why a healthy Everglades ecosystem is important to their supply of fresh water.

Background: The ebb and flow of water through the Everglades is important to the survival of the plants and animals which have become adapted to this natural cycle. But that water flow is important to humans as well; indirectly, we get our fresh drinking water from the Everglades. If you have recently taken a shower, brushed your teeth, or turned on your faucet, then you have used water from our **aquifer**. An aquifer is like a giant, underground storage tank, and is the source of our water here in South Florida. It gets used by humans, and refilled as a natural part of our water cycle.

Materials:

- “Slough” Habitat Video
- Container
- Sponge
- Laminated card
- Beakers with ml measurements
- Water

Water comes to Earth in the form of rainfall, or precipitation. In South Florida, that water flows through the Everglades. Some of it will flow all the way out to our bays or oceans, evaporating along the way to condense and become more precipitation; some water is used by plants and animals for survival; some water will also seep under the ground (a process called **percolation**) to refill the aquifer for human use. Without water flowing through the Everglades, our source of water (the **aquifer**) will start to run low.

Procedures:

Before starting this activity, students should have a basic understanding of the water cycle. Watch the “Slough” video from our Mountains & Valleys series, and then begin with a review of the water cycle, relating it directly to the Everglades. Lead a discussion with the following series of questions (answers and talking points are in *italics*):

- Where does the water in Shark Valley Slough come from? *Lake Okeechobee, canals, rainfall*
- When does the Slough receive most of its water? *In the wet or rainy season.*
- During the dry season, water levels in the Slough drop dramatically – what happens to all of that water? *It flows out. To where? To the Gulf of Mexico, Florida Bay, and Atlantic Ocean.*
- Does it all flow out? What else could happen to it? *It could evaporate or be used by an organism.*
- Think about what happens when it rains on a grassy area; does it just sit there? *No; water can be absorbed into the ground.*

Continue the discussion by explaining the following (or ask more questions):

- When water seeps into the ground, it is referred to as **percolation**.

- Under S. Florida, there is a large, natural storage tank (formed by layers of clay and limestone) called an **aquifer**.
- Some of the water from the Slough will **percolate** into the **aquifer**.
- Humans drill wells into the **aquifer**, and pump the water up for us to use. Most people in S. Florida (including you!) get their water from this **aquifer**.

Let's perform an experiment that shows how water from the Slough makes its way into our aquifer...

- Distribute materials (container, sponge, laminated card and beaker); you can do one experiment per class, or have multiple groups performing the same experiment.
- Set up a sponge in a small container, with one end propped up on the edge to make a slope
- The sponge represents our aquifer, and the surface of it is our freshwater slough
- Measure 200 ml of water into a beaker, and pour it out *slowly* over the sponge... *does the sponge (aquifer) absorb all of the water? What does the excess represent? (evaporation, water flow through the Everglades and into the ocean, use by plants and animals)*
- Remove the sponge and squeeze the water into the beaker to measure the amount of **percolation** (keep squeezing!)... *record the amount of water absorbed by the aquifer*
- Pour the excess water from the container back into the beaker (you should have 200 ml again)

We have enough fresh water from the aquifer to expand our population! But we need dry land to develop, so let's construct a canal to drain this part of the Slough and build a shopping center over it.

- Place the laminated card over the sponge and repeat the experiment... *record how much water percolated into our aquifer after the land over it has been subjected to human "development."*

Evaluation:

- Define aquifer; explain its importance to our communities, and how it refills.
- Did our aquifer receive as much water after the Slough was destroyed? Where did it go instead? How does this affect us?
- What will happen if water is not able to percolate into the aquifer?
- Describe the importance of natural wetlands to modern human civilization.

Extension Activities and Video Questions:

- Does all the water flow into the Slough naturally? How does the Slough get water?
- Do animals that live in the Slough always need lots of water? Explain.
- Look at a map of the Everglades freshwater slough: where does it flow to? What other habitats depend on this natural, freshwater flow?
- Construct a model aquifer using gravel, sand, dirt, grass clippings, colored water, etc. (see website for example: <http://www.sciencelearn.org.nz/Contexts/H2O-On-the-Go/Sci-Media/Video/Building-an-aquifer-model>)

Related Activities from Park Website:

- The Rainy Season in Three Cups
- Water Poetry
- The Water Watch